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Building & Highway Material Testing Laboratory

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NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005

JAS-ANZ BSCIC ISO 9001 REGISTERED

Job No.: CTCE/BBMP/NMS/W.No.10/WMM/Gradation/2015-16 08.04.2015

GRADATION FOR WMM

Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. N.M. Shivakumar,**
#07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.

Name of Work : Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015

Date of Testing : 08.04.2015

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	85	85	1.7	98.3	95-100
22.4	1665	1750	35.00	65.00	60-80
11.2	950	2700	54.00	46.00	40-60
4.75	355	3055	61.10	38.90	25-40
2.36	715	3770	75.40	24.60	15-30
0.600	695	4465	89.30	10.70	8-22
0.075	355	4820	96.40	3.60	0-8

Note:

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Job No.: CTCE/BBMP/NMS/W.No.10/WMM/Gradation/2016-17

08.04.2015

GRADATION FOR WMM

Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. N.M. Shivakumar,**
#07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.

Name of Work : Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015

Date of Testing : 08.04.2015

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	105	105	2.1	97.9	95-100
22.4	1745	1850	37.00	63.00	60-80
11.2	960	2810	56.20	43.80	40-60
4.75	325	3135	62.70	37.30	25-40
2.36	720	3855	77.10	22.90	15-30
0.600	595	4450	89.00	11.00	8-22
0.075	215	4665	93.30	6.70	0-8

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08.04.2015

GRADATION FOR WMM

Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. N.M. Shivakumar,**
#07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.

Name of Work : Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015

Date of Testing : 08.04.2015

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	85	85	1.7	98.3	95-100
22.4	1675	1760	35.20	64.80	60-80
11.2	980	2740	54.80	45.20	40-60
4.75	345	3085	61.70	38.30	25-40
2.36	715	3800	76.00	24.00	15-30
0.600	665	4465	89.30	10.70	8-22
0.075	340	4805	96.10	3.90	0-8

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Job No.: CTCE/BBMP/NMS/W.No.10/WMM/AIV/2015-16

08.04.2015

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
Name of the Work	Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	08.04.2015

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	387	391	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	88	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	299	306	
4	Aggregate Impact value = percent fines	22.74	21.74	
	100* (W_2/W_1)%			22.24

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/NMS/W.No.10/WMM/AIV/2015-16 08.04.2015

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
Name of the Work	Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	08.04.2015

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	385	389	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	84	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	303	
4	Aggregate Impact value = percent fines	21.82	22.11	
	100* (W_2/W_1)%			**21.96**

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/NMS/W.No.10/WMM/S-T/2015-16 08.04.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
Name of Work	Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	08.04.2015

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **11.85%**

Elongation Index = **13.69%**

Result : Combined Flakiness & Elongation index 25.54%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

Note:

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Job No.: CTCE/BBMP/NMS/W.No.10/WMM/S-T/2015-16 08.04.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
Name of Work	Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	08.04.2015

Result : Flakiness Index = **12.84%**

Elongation Index = **13.47%**

Result : Combined Flakiness & Elongation index 26.31%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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T-2377

Job No.: CTCE/BBMP/NMS/W.No.10/CSR-04/815d/QB(SDBC)/2015-16 17.04.2015

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
*AGENCY	:	**Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
*NAME OF THE WORK	:	Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	:	EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	15.04.2015
DARE OF TESTING	:	17.04.2015

The results of the tests conducted on the bitumen sample.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	87	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	44	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	290	Min. 220

*Information is furnished by the Customer/Representative.

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VISHWANATH C.
Quality Manager

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Job No.: CTCE/BBMP/NMS/W.No.10/SDBC/AIV/2015-16 17.04.2015

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
Name of the Work	Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	17.04.2015

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	391	387	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	85	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	306	301	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	21.74	22.22	21.98

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/NMS/W.No.10/SDBC/Shape_T/2015-16 : 17.04.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	: **Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
Name of Work	: Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	: EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 17.04.2015

Result : Flakiness Index = **11.57%**

Elongation Index = **13.69%**

Result : Combined Flakiness & Elongation index **25.26%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/NMS/W.No.10/SDBC/Stripping/2015-16 18.04.2015

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
Name of the work	Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	18.04.2015

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.4	3.30	96.70
2	3.2		
3	3.3		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/NMS/W.No.10/SDBC/Sp_Wa/2015-16 18.04.2015

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
Name of the Work	Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	18.04.2015

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2022	2023	2025	
2	Weight of basket suspended in water	W_2 g	755	2020	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1267	1268	1270	
4	Weight of saturated surface dry aggregate in air	W_3 g	2015	2014	2016	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	748	746	746	
6	Weight of oven dried aggregate	W_4 g	1996	1996	2000	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.668	2.676	2.681	2.675
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.738	2.742	2.740	2.740
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.95%	0.90%	0.80%	0.88%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/NMS/W.No.10/SDBC/Bit/2015-16 18.04.2015

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC:SP:-1984

CUSTOMER	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
NAME OF THE WORK	Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015
SAMPLE I/D	2nd Main Chamundeshwari Layout Ward No.10, BBMP, Bangalore.
DATE OF TESTING	18.04.2015

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475	474
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25	26.00
7. Bitumen content in %	5.00	5.20
8. Average	**5.10**	

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NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005

Job No.: CTCE/BBMP/NMS/W.No.10/SDBC/Bit/2015-16 18.04.2015

BITUMEN CONTENT GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CUSTOMER	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
NAME OF THE WORK	Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated:
SAMPLE I/D	2nd Main Chamundeshwari Layout Ward No.10, BBMP, Bangalore.
DATE OF TESTING	18.04.2015

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	26.32	5.54	5.54	94.46	90-100
4.75	260.4	54.82	60.36	39.64	35-51
2.36	55.12	11.60	71.97	28.03	24-39
1.18	37.45	7.88	79.85	20.15	15-30
0.3	34.23	7.21	87.06	12.94	9-19
0.075	37.52	7.90	94.96	5.04	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	34.23	7.22	7.22	92.78	90-100
4.75	258.6	54.56	61.78	38.22	35-51
2.36	53.64	11.32	73.09	26.91	24-39
1.18	36.23	7.64	80.74	19.26	15-30
0.3	33.24	7.01	87.75	12.25	9-19
0.075	31.25	6.59	94.34	5.66	3-8

Note:

Þ This test report should not be reproduced except in full, without written approval of the laboratory

Þ The results indicated above are based on the tests carried out on the samples received in the laboratory

Þ Any Query regarding the report must be reported within 30 days from the date of testing.

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CIVIL-TECH CONSULTANTS AND ENGINEERS

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Job No.: CTCE/BBMP/NMS/W.No.10/SDBC/AGG/2015-16 18.04.2015

Aggregate Gradation Test

IS : 2386 Part I

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shivakumar,** #07, 2nd Block, Junganahalli, Rajajinagara, Bangalore.
Name of the Work	Asphalting to Roads at 2nd Main Chamundeshwari Layout in Ward No.10 (Doddabommasandra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(13882)/WO/276/2014-15 Dated: 03.02.2015
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	18.04.2015

Total Weight of Sample: **5200** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	346	6.7	6.65	93.35	90-100	
4.75	2658	51.1	57.77	42.23	35-51	
2.36	715	13.8	71.52	28.48	24-39	
1.18	475	9.1	80.65	19.35	15-30	
0.3	450	8.7	89.31	10.69	9-19	
0.075	315	6.1	95.37	4.63	3-8	

Total Weight of Sample: **5250** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	365	7.0	6.95	93.05	90-100	
4.75	2568	48.9	55.87	44.13	35-51	
2.36	915	17.4	73.30	26.70	24-39	
1.18	514	9.8	83.09	16.91	15-30	
0.3	246	4.7	87.77	12.23	9-19	
0.075	285	5.4	93.20	6.80	3-8	

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